1 Farmers in Asia add fertiliser to their crops to increase the yield.

Fertilisers usually contain nitrate, phosphate and potassium.

The table shows the farmers' crop yield when the crops are given a fertiliser lacking one of these three minerals.

A figure of 100% is the maximum yield with all three minerals given.

	Yield (%)			
Crop	**No nitrate**	**No phosphate**	**No potassium**	**All three minerals added**
lowland rice	73	97	99	100
barley	52	66	72	100
rye	44	70	68	100
wheat	46	69	72	100
upland rice	46	66	90	100
potato	47	47	70	100

(a) (i) State the mineral that has the greatest effect on crop yield.

(1)

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(ii) Explain why this mineral has the greatest effect on crop yield.

(2)

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(b) Which crop is most affected by the lack of potassium?

(1)

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(c) Suggest why the minerals had different effects on lowland rice and upland rice.

(1)

(d) The yield is the mass of the useable part of the crop and is measured in kg per m^2.
The yield is often measured in dry mass rather than fresh mass.

(i) Suggest why dry mass is used.

(1)

(ii) Suggest how the dry mass of 10 kg of fresh potato tubers could be determined.

(2)

(e) The table gives data as a percentage of the yield with all minerals present.

Explain why a percentage is used rather than changes in kg per m^2.

(2)

(f) A farmer grew another crop with all three minerals added. The maximum yield obtained was 12 kg per m^2. He grew the same crop with no nitrate and the yield was 5 kg per m^2.

Calculate the percentage of the maximum yield when the crop was grown with no nitrate.

Show your working.

(2)

Answer ..... %

(Total for Question = 12 marks)

2 Some rice farmers use ducks as a method of biological control.

The photograph shows ducks swimming in a rice paddy field.

© Takao Furuno

The ducks help rice plants to grow because they eat insects and weeds in the paddy fields.

(a) (i) Suggest how the ducks eating insects helps rice plants to grow.

(1)

(ii) Explain how the ducks eating weeds helps rice plants to grow.

(2)

(b) Explain why faeces from the ducks helps rice plants to grow.

(2)

(c) The ducks stir up the soil in the rice paddy field with their feet, which increases the oxygen content of the soil.

Suggest how increasing the oxygen content of the soil helps rice plants to grow.

(2)

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(d) Using ducks as a method of biological control allows the farmer to grow rice without using herbicide or pesticide.

(i) Suggest what is meant by the term **herbicide**.

(1)

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(ii) Give three advantages of using biological control rather than using pesticide.

(3)

1 .....

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2 .....

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3 .....

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(Total for Question = 11 marks)

3 Fish farming provides protein for humans to eat.

(a) A freshwater fish farmer noticed the following problems.

Suggest the cause of each problem and a solution for the farmer.

(i) An increase in the number of bird predators in the area.

(2)

cause .....

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solution .....

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(ii) An increase in the growth of algae on the surface of the fish ponds.

(4)

cause .....

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solution .....

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(iii) An increase in the number of fish with a disease.

(2)

cause .....

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solution .....

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(b) Suggest two advantages of fish farming compared to catching fish in the wild.

(2)

1 .....

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2 .....

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(Total for Question = 10 marks)

4 A school in Uganda made a large freshwater pond so that their students could investigate the factors that fish need to grow well in a fish farm.

(a) Suggest how the students should maintain the water quality in their pond.

(2)

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(b) Suggest how the students could control predation in their pond.

(2)

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(c) Suggest how the students could control disease in their pond.

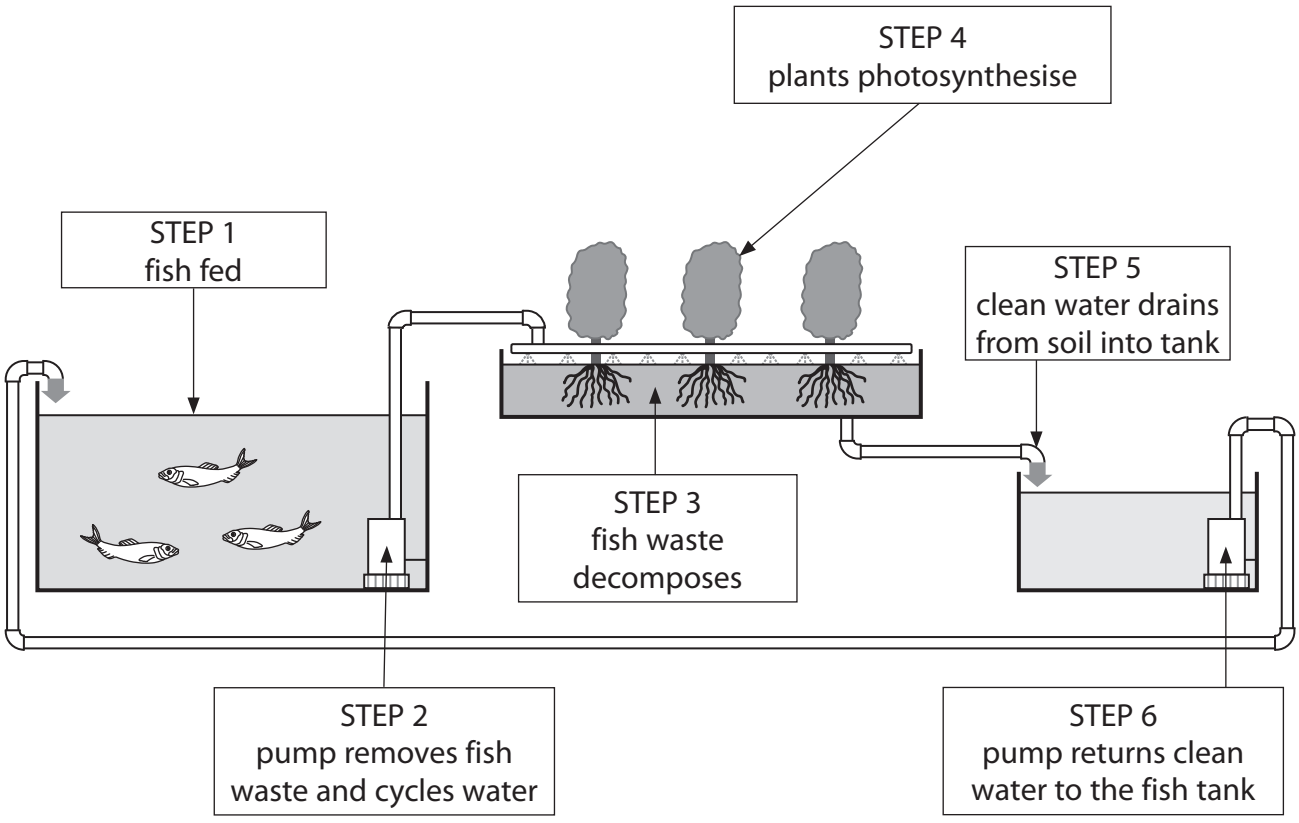
(2)

(d) Suggest the feeding methods the students should use in their pond.

(2)

(Total for Question = 8 marks)

5 The diagram shows how water flow is controlled in a fish farm to maintain water quality.



(a) Name a waste product produced by the fish.

(1)

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(b) (i) Explain how the removal of fish waste helps to maintain water quality.

(2)

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(ii) Explain how adding antibiotics would also help to maintain water quality.

(2)

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(c) The fish waste from step 2 is used by the plants in steps 3 and 4.

Describe how the fish waste helps the plants to grow.

(4)

(d) Suggest what could be done on this fish farm to prevent interspecific predation.

(1)

(Total for Question = 10 marks)